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19 August 1985

# USSR Report

ENERGY

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ENERGY

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OIL AND GAS

IZVESTIYA SERIES DISCUSSES WEST SIBERIAN OIL, GAS PROBLEMS

Moscow IZVESTIYA in Russian 27, 28, 31 May 85

[First article in series by L. Levitskiy, R. Lynev and Yu. Perepletkin: "The Difficult Millions"]

[27 May 85 p 2]

[Text] Tyumen--"This is Baikal!", said Vladimir Timofeyevich Gromov, tool pusher and USSR State Prize laureate, in a conversation with us.

He said this about the area beyond the Urals. The tool pusher was, allow us to mention, in a holiday mood, as May Day and Victory Day were approaching. And on the eve of the holidays Gromov and his crew had gained their own victory, and not a minor one: they had, eight months ahead of schedule, fulfilled the five-year plan for well-drilling footage. For Gromov, who had begun his working career searching for underground mineral wealth in Eastern Siberia, Baikal was the standard, not only of natural power, but also of the sweep and beauty of human endeavor. Here, in the Tyumen Oblast, this sweep and beauty are everywhere.

Take the names on the map. From where does this one--the Povkhovskoye Field--come? It is in memory of Stepan Anan'yevich Povkhe, who drilled the first development well in the now-famous Samotlor. The Bakhilov Field was named as a token of gratitude to the party leader and Hero of Socialist Labor Vasil'y Vasil'yevich Bakhilov, who was a commissar in the offensive for a large-scale petroleum industry. And Korotchayevo is the name of a railroad station, and was named in honor of the honored builder Dmitriy Ivanovich Korotchayev, another Hero of Labor.

And what is Gromov doing these days? What of the other renowned subjugator of the earth's interior Gennadiy Mikhaylovich Levin? His was the first crew to reach the 100,000 meter mark for well footage sunk. Just as the communist Levin took over the drilling operations which were the most proficient in Siberia, his entire collective sank 100,000 meters worth of wells per crew. This is truthfully the land of heroes!

It seems all the more strange that a decline has been noted recently in the operations of the Siberian oil workers. Last year they underproduced oil



by several million tons. And they began this year with a minus as well. And indeed, a deficiency in recovery of millions of tons of oil means barely warm thermal batteries in homes as well as a bit of a strain with the refinery plan and an interruption in transport operations. So is it of no concern to us whether we have sufficiently long-lasting reserves here? Or has the "first bell" rung, notifying us that the case is somewhat different?

Concerning our reserves, let us listen to the considered opinion of I. Nesterov, director of ZapsibNIGNI [possibly Western Siberian Scientific Research Geophysical and Petroleum Institute] in Tyumen, and member-correspondent of the USSR Academy of Sciences.

"The earth's potential is far from being exhausted. New discoveries will undoubtedly be made, and already are being made. There is, for example, the Krasnoleninskoye Field. True, the oil workers are breaking through to somewhat shallower formations, but we believe them to comprise a promising mineral store. This field has just begun to be developed. Let us take into consideration as well that the Siberian geologists have overfulfilled their five-year plan regarding the increase of oil and gas reserves. It is true that the new fields are situated farther from inhabited areas and supply lines, so that makes them more difficult to develop. But these fields have so far all been discovered, so to speak, on the upper stage of the Western Siberian lowland. In fact, we have still not reached the lower formations and haven't touched the more complicated structures, where more up-to-date equipment is needed for exploration and surveying operations, geophysical equipment in particular. The question of this equipment accomplishing the needed goals was recently taken up by the Politburo of the CPSU Central Committee. Expanding the search still farther in the North, we believe that there is oil beneath almost every giant gas formation known of at present. But it will naturally be more complicated and expensive to recover the oil than at present.

The optimism is restrained, but well-grounded. Considering this optimism, one understands that the figure cited from the high tribune of the 26th Party Congress was practicable. And we recall that the figure sounded like this: 500 million tons per year is the amount of oil Western Siberia can produce. Soon it showed up in print that 500 million tons was not the limit. And it seemed like everything was headed in that direction.

This optimism was corroborated by science. A comprehensive program for developing the Western Siberian fuel-energy complex was developed by collectives from the leading oil and gas, and geological institutes. Many volumes of estimates and calculations formed the program's basis. According to these calculations, oil recovery levels should reach 400 million tons as soon as the end of the current five-year plan period. But in fact, the end of the five-year plan period is near, and the situation is such that, having reached its highest point--365 million tons--the recovery levels for oil and condensate have still turned out to be lower than planned.

Now, one remembers the arguments of the petroleum industry specialists, and primarily of the directors of Glavtyumenneftegaz [Main Tyumen Oblast Administration for Petroleum and Gas Production], which is the largest petroleum firm in the world, and which is headed by Hero of Socialist Labor and winner of

the Lenin and State prizes Viktor Ivanovich Muravlenko (who also had one of the oil fields named in his honor). This was one of the fields which from the very beginning were counted among those which looked promising enough to produce "500 and more" millions of tons of petroleum per year. The fact that Western Siberia's total reserves can insure this take-off in production is an isolated instance which has been established by those mentioned above. But in fact there still exist the economic system, the technical level, the construction base and the supply systems which lag behind the leader--recovery levels--and within which substantial changes are ripening. What kind of changes?

One quarter of the 200 Western Siberian fields are in operation. These fields contain a major portion of the reserves. More and more water is coming up with the oil from wells in the primary areas. In many places, it accounts for more than half of the output. And in general, the time when oil under great pressure used to burst upward and spew in gushers--a time we refer to as extensive--has passed for the most part. And before us--the next period, when the oil will have to be extracted in different ways. As the oil workers say, this is the stage of getting out "on the shelf", at the maximum attainable level. And we must prepare ourselves for this. In what way? By developing services for maintaining formation pressure. By reconstructing, so to speak, wells which no longer flow of their own accord, and converting them to another recovery mode, i.e., mechanized recovery. In order to do this, equipment has to be made, and here again, special services set up to bring in workers. Housing has to be constructed for them and their families, and the conditions created for their work and leisure. In short, we must do the things that have long been done in the old and established oil producing areas, and which require considerable investments. But this is the sole, unavoidable way. It is self-evident to any oil worker. It's as plain as the nose on your face. But in fact, as everyone knows, there are other axioms which come about differently.

We will not conceal the fact that we too have heard, as they say, that the field personnel began getting ready to get out "on the shelf" too soon. That it is as if their actions were redolent of the desire to live somewhat easier, having guaranteed themselves bonuses by overfulfilling plans which were not pushed to the limit, and which approached four and five million tons per year and which surpassed these levels. Muravlenko and the others who talked of moving out "onto the shelf" were nicknamed "limitationists", which meant those of little faith, the sceptics. As expressed by one of the oil workers we talked to, the "enticement" of large, attractive figures has already done its work.

The large recovery figures were not, as such, the only enticement. Equally tempting was the flow method used, which up to a certain time permitted a great deal of oil to be extracted, both quickly and cheaply. A practicable perspective and tomorrow's demands have been supplanted by the dictates of the present: pump it out, and keep on pumping it out. Using this approach, Baikal, too, will be small-scale. And 500 million tons can be pumped out every year, but at what price?

In point of fact, the price by which today's hundreds of millions of tons of oil are being recovered, is already high. And here, it would be correct to count not only the capital outlays used to develop the region during the current five-year plan, and not count that given to the Siberians, or the amount by which the technicians underproduced the plan, or the facilities which were not constructed. The extent of these uncompleted construction projects and deficiencies in deliveries is extremely great as well. How, in this connection, is the plan to be fulfilled? How are the country's demands for fuel and raw materials to be met, while at the same time smoothing down the economy's many rough spots?

By emergency measures, forcible measures. Temporary measures. Thus, in order for oil recovery levels to be increased during this five-year plan period, 26 new fields were slated to be put into operation. But only 14 were developed. The rest suffered from manpower and equipment shortages. As a result, in order to fulfill the plan, they had to open the valves wider at wellsites where the oil still flowed. These wells and wellsites reached their projected capacity ahead of schedule, but at the same time their oil runs dry sooner. This too is part of the price which has to be paid for oil, and it is very high.

Or another disproportion. They say that in order to increase the recovery level from the formations, more wells should be drilled. This is correct. But just counting the present number of wells which have ceased to flow and are awaiting reconstruction for conversion to mechanized recovery, the number comes to several thousand. Above any norm. The most active portion of the productive capital has been deadened. Each of these oil wells, which are an average of 2000 m deep, costs a minimum of 200,000 rubles. They also tried to make up for the underproduction from these wells by using the flow method of well operation and by overloading the best areas. And all these measures were thought to be temporary.

They say that the earth forgives nothing. Of course, this is so. At the same time, the earth, in response to the heroism of its people, has put up with a lot. And the earth has schooled us to the notion that this munificence will last forever. V. Lobasenko, deputy secretary of the Nizhnevartovsk-neftegaz [Nizhevartovsk Oil and Gas Administration] Association party committee put it this way: "In the final analysis, all this distorts the oil workers' psychology, as well as the oil workers themselves."

One can recall many decisions which were adopted in accordance with the principle of doing only that which cannot be done without today, and postponing all the rest until later, until more favorable times. That is how a multitude of temporary houses were erected, supply lines laid and other temporary structures constructed. Having been assembled, these "temporary factors" acquired no little importance, and accustomed many people to think and act according to a "temporary scheme of things" in places where a permanent and reliable system was needed. At the initial stage of development, when the Siberian workers sometimes had no ready solutions, or solutions were available, but were not suitable to the local conditions, this "temporary-oriented" approach



was excused. And today, at the second stage, not only are the stronger features of this trailblazing approach all the more obvious, but the weaker features as well. In order to abandon these weaker features, we need that precise conceptual boldness and audacity of action--true trailblazing courage.

The people of Glavtyumenneftegaz and its associations want to learn a lesson from the past. And there are some good examples to learn from. To the credit of the Yuganskneftegaz [Yugansk Oil and Gas Production Association] directors, led by General Director Yu. Vershinin (now main administration chief engineer) they guided the efforts of their collective from the very beginning to systematic operation of the well stock, avoiding the enticement of flow operation. As a result the association turned out to be the only one fulfilling last year's plan, and the present plan has certainly been started with confidence.

Today it is already obvious that the upcoming five-year plan will not be easy for the Siberian oil workers. This is primarily due to the fact that they cannot count on achieving their past impressive oil recovery levels, and even to maintain their present level, they will need considerably more assets than for the current five-year plan.

The number of oil and gas wells will have to be increased 1.5-fold. Accordingly, more workers will also be needed. There is no doubt that the labor force will have to be trained both here, in Siberia, and wide use will have to be made of the assistance of our associates from the Tatar, Bashkir, Azerbaijani and other oil-producing regions, more energetic use will have to be made of the achievements of scientific and technical progress, and we will have to implement advanced organization of labor and use the experience of the best people, such as G. Levin, F. Krylov, A. Shakshin, V. Pyatkov and other experts in their fields.

"The 12th Five-Year Plan," believes V. Dinkov, minister of the USSR Oil Industry, "should become the five-year plan period for tightening up our supply lines, and converting to a proportional development both of individual areas and the Tyumen complex as a whole."

This is the overview, so to speak. However, in our view, everything is more fully, more precisely and more concretely obvious than that which the Siberians are rightfully proud of, or which is distressing them these days, in the most famous of the Siberian fields--Samotlor, the subject of our next discussion.

[28 May 85 p 2]

[Second article in series by L. Levitskiy, R. Lynev and Yu. Perepletkin: "The Fracture"]

[Text] Tyumen-Nizhnevartovsk--Surprise has its own shadings. A sharp clap of noise has interrupted the brief morning shift change of specialists at the integrated gathering station. In the flat on the very edge of the little man-made island which takes the oil from 400 wells and prepares it for shipment, flames have flared up, and dark oily clouds of smoke have appeared.

"A fracture on the 700-mm flowline," someone determines, absolutely emotionlessly, and particularly businesslike.

A 700-mm diameter pipe has turned into a huge flamethrower. Unable to endure the first pipe's incandescent breath, still another pipeline, adjacent to the first, explodes. Fortunately, both the fire and the oil have gone into a ravine. But there are costly engineering structures on one of its banks and on the other, the LEP [power transmission line] which supplies power to all of Samotlor. The field personnel have rushed into the clouds of smoke. The families of the specialists who have succeeded in shutting down the oil-collecting system have long since learned to bring misfortune to a standstill. And here it would seem that we should have recounted the courage and selflessness of the handful of people who took the first blow upon themselves. But something was awry, perplexing. And it was as if these circumstances were in no way exceptional. And the entirety of their unexpected surprise lay in the fact that they happened on a Saturday morning.

"I knew that old 700-mm pipeline was worn out and dangerous as well. We've laid a new line. It would've taken just a couple more days...", said V. Sekerin, chief engineer of the Nizhnevartovskneftegaz Association, blaming himself as he came running up to the scene of the accident. And later, when the danger had passed, he reiterated, "I know where the trouble spot is, but we haven't had time to repair it; we don't have the manpower...."

Does he mean that in this very area, in the country's main field, there is a lack of manpower? Is such a thing possible? And if it has become so, then why?

Samotlor. Its early days are mentioned in songs, books and films.

We will not recount them here. Only the basic chronology is important to our discussion. In the 20 years which have passed since its discovery, and the 15 years of its having been in operation this storehouse has produced almost 2 billion tons of fuel. Its appearance in the economy is so utterly unique, as are the conditions in which the field is situated. A procedure for taking possession of a new source of energy from beneath a dead lake had to be learned. That is why the phrase "for the first time" became identified with Samotlor. New solutions saved years of time, hundreds of millions of rubles were saved and a method of getting to the oil was worked out.

This is where the famous "well clusters" were born, from which wide use was made of the slant hole method of well drilling. This is where we learned how to turn boggy liquid into solid ground and islands, and to lay concrete roads where not even elk had made their way. Unified comprehensive oil-gathering stations were sited right on these man-made areas. In fact, this is where the integrated module method for erecting all the field facilities was proven. Here the planners discovered original procedures for developing and maintaining formation pressure and for separating oil and gas pools. That is to say that it became immediately obvious that past experience and knowledge would not suffice in this new petroliferous province, with its

unusual mineral stores. That was why one began hearing terms such as "testing ground" and "petroleum academy" applied to Samotlor. The innovations which we have mentioned saved us years, saved hundreds of millions of rubles and showed us how to get to the oil.

Samotlor's high point was the year 1980. That's the year a little less than 155 million tons of oil were recovered there. In accordance with the millions there came words of gratitude to the field personnel, bonuses and rewards. But the fields, much like living organisms, develop and grow stronger, and having passed their limits of maturation, grow old. And the less care taken with regard to their health and potentialities early on, the faster all this happens. Samotlor did not maintain its position on the summit. The long slide downward began. In addition there was a disruption of the plans. A major portion of Tyumen's oil obligation was made up by Samotlor's share.

One of the reasons for this was that oil recovery anticipated the construction of surface field facilities by almost four years. The facilities were not built according to either geological or technical norms, and diverged from the design by almost R1.5 billion. The systems which were to maintain formation pressure and to prepare the oil lagged drastically, there were no production bases and there was insufficient housing. This conformity to principle is typical: the least amount of funds were allocated, and design and planning assignments were set up very poorly with regard to their being executed with utmost dispatch. And all this at a time when this field was in dire need of compensation for the power it had expended. And only the sharpness of the decline forced both the main administration and the ministry to increase the capital investments.

We have familiarized ourselves with a curious document. As long ago as 1978, Ye. Yefremov, the then deputy director of the Siberian Scientific Research Institute of the Petroleum Industry made a report to Deputy Minister E. Khalilov concerning some plan violations. Concerning excessive overworking of the most thoroughly explored and accessible reservoirs while neglecting the remainder, and of the deviation from production methods and the unwillingness to introduce mechanized recovery methods. In short, he informed the minister of the disruptions occurring along the entire production network and in the operational system. Similar misgivings were expressed by scientists of the VNIIPinefti [All-Union Scientific-Research and Planning Institute of Petroleum] and operator-geologists as well. They went unheard in the rumble of the gushers.

"Every field has its own sort of obstinacies. We select the developmental procedures and equipment to suit the field's character and potentialities," says Ye. Yefremov, who is presently director of SibNIINP [Siberian Scientific-Research Institute of the Petroleum Industry]. "They didn't implement our proposals at Samotlor. Minkhimash [Ministry of Chemical and Petroleum Machine Building] was about 10 years behind in their equipment deliveries.

We checked and we were assured: everything which had been suggested to be used at Samotlor was the best, as well as that which remained through the wishes of the designers. One lone example. The gas-lift method should be used in the operation of 3,804 wells, whereas only 1,376 have been converted to its use. If, during the years of its build-up, Samotlor was in fact also used as a testing ground, then it lost its innovative aspect long ago. It's as though all that inventiveness and creativity were necessary only to make it possible to get to the oil. No academy came into being.

"A field like Samotlor should have a plan for the organization of labor, and a scientifically grounded structure for its enterprises and its work force. We asked the institutes to work out a control system, but no one responded," complains V. Fumberg, deputy general director of the association, and candidate of economic sciences.

Similar miscalculations went unnoticed behind the rainbow of gushers. But the uncontrollable well-heads, which were producing their thousands of tons of oil ran dry before our eyes. In terms of output, each of them was equal to 20 or 30 mechanized wells. Since no one had to look after them, one after another, they stopped producing. There are over 2000 wells standing idle. Samotlor, which came to the aid of nearby and not-so-nearby fields so many times, now began asking for help for itself.

It took on a very peculiar form. In Nizhnevartovsk waves of inspectors and authorized agents from the widest possible variety of levels rushed in. Occasionally, as many as 10 commissions could simultaneously be found in the associations and administrations. And each of these commissions drew specialists aside for explanations and to write up measures and obligations which were to appear on the time-table.

Frequently these delegates showed up in order to urge a rush job so as to achieve, albeit temporarily, an increase in recovery from the specialists. Then they would return to Tyumen and Moscow with guarantees of an impending turnaround. But the turnarounds themselves were already secondary.

"What was all this for?", angrily asked V. Keloglu, director of the Samotlor-neft' Administration, when we spoke to him about those empty promises. "They demanded that I provide measures to aid the plan level. Of course, they calmed us down, telling us to ask anything we wished and they would provide it. They no longer recalled what I requested. So the promises were broken as well.

Vladimir Yur'yevich did not choose the oil business right away. He is a physicist by profession, a graduate of Moscow University. Fate turned him toward the job of field foreman. He graduated from an industrial institute by taking correspondence courses. And graduated from the Samotlor "institute" by using his eyes: he omitted nothing, and learned a step at a time. He spent about five years as the administration's chief engineer. As a chief engineer, opinions of him are very favorable. He gets complaints concerning these extremely ill-fated measures. For him, evidently, the contacts with the authorized agents did not go off without leaving marks. And not only for him. They were



spoken of so bitterly in the association party committee that now the hardest thing is to get the administrators to speak the truth, to think and to work in a practicable fashion for the future.

Up to now, Deputy Minister A. Valikhanova's team, which was authorized to come to the Varyegansk Field, has been thought of with a sense of perplexity here. In order to bring about an immediate increase in the recovery level, he ordered express delivery of quite a number of winches and scrapers to remove paraffin from the wells, equipment which the workers of Nizhnevartovsk had never had at their disposal. The boom, which solved nothing, was erected in the presence of hundreds of people.

These frequently rash solutions which are made in the pursuit of easy success turn into serious defeats. At the end of last year, ministry directors ordered the cessation of the operation for maintaining the recovery of oil from the formations, and ordered a major overhaul of the wells. The interdiction was carried out vigorously. A skilled service and bases, which had taken years to develop, were torn down in a month. Even the two-week termination benefit was paid in full. This happened all over Tyumen.

The basis for the order was what seemed like a good concept, i.e. to increase the number of extractive enterprises and to augment recovery personnel with maintenance workers. An organizational Trish's caftan. They tried to stretch it to Samotlor, but to no avail.

"We grew up on this land in the most difficult of times. We know how to treat it. We will certainly prevail. It's just a matter of time." Thus ended our conversation with V. Keloglu. But others with whom we spoke expressed the same hope. The directors and specialists are changed so often that it's hardly possible for them to get to know their subordinates. The average tour of duty for a chief of an oil extracting administration is about two years, and about a year and a month for a chief engineer.

Now the reorganization and the transfer have been brought to a halt. A turning of the new leadership of the main administration and the ministry toward a serious realization of what has occurred, and Samotlor's problems, has been noticed. Samotlor has been given first aid: a hundred brigades from other areas have begun to treat the wells.

"We've determined which directions will get us away from this rupture, and we could get away from them completely," says V. Sekerin, the chief engineer, who has returned from the accident to the 9th gathering station, and with whom we have been talking for quite a while. He is familiar with both the most impending and the remotest prospects. He does not hide his misgivings. The possibilities for maneuvering are extremely limited. The lags in recovery, which are within two percent of the plan have shaken his economic system. There are no funds for technical or social development, and nothing with which to settle accounts with his suppliers. More and more shallow and dangerous sites are showing up in the field and its facilities. And first and foremost are the thousand km of the field's pipelines. Three to four ruptures occur

on a frequent basis. Even if not all of them end up in explosions and fires, the point is that many thousands of tons of oil are lost. It is not known how the element of explosions will be prevented, or when the pipe, eaten away with rust, will be changed, or even who will do it.

As a result of the fire at the 9th gathering station complex, 112 highly productive wells have been shut down. By their unbelievable efforts, two oil-extracting administrations and transport and construction workers cleared away the accident's aftereffects. The next, a Sunday, we visited the 9th gathering station again. The strong and nimble "Tatars" [tatry] were pouring out a sand embankment, which bulldozers immediately levelled. There was a drizzle of rain mixed with snow, and the freshly laid road began to disintegrate right before our eyes, barely having managed to allow the special equipment get through. The men erected three pipelines. The electricians replaced the charred wire of the low-voltage line. The selflessness and the skill exhibited in these extraordinary circumstances evoked respect and admiration. By evening they had succeeded in starting up the wells, even if temporarily.

In the clear dusk, we returned. Like everyone else, we were greeted at the city's entrance by the monument to those who conquered Samotlor. It occurred to us that the trailblazers of Urengoy and Yamburg had entered into a contest of bravery. How would the fate of these Arctic supergiant gas fields shape up?

[31 May 85 p 2]

[Third article in series by L. Levitskiy, R. Lynev and Yu. Perepletkin: "Urengoy's Younger Brother"]

[Text] In the old days, the now-famous Yamburg had a namesake: the city of Yamburg. The Tyumen Oblast itself and Arctic Yamburg are on the eastern bank of the Ob inlet, had never existed as either a city or a settlement. Only as space, and as a huge marsh.

These are severe places. The penetrating Arctic winds and the storms on the Ob inlet, and there are the fierce, protracted freezes and the hordes of winged, blood-sucking insects. For hundreds of kilometers in all directions there is an unpopulated icy silence in the winter and the invincible marshes in the summer. And only the top layer of the soil thaws, so deep in--300-400 meters into the granite, which, similar to permafrost, and which sets thousands of riddles. Building a foundation, driving a pile or drilling a well--any of these normal endeavors is turned into a problem.

Yamburg...A unique northern storehouse where reserves of gas, condensate and possibly even oil are hidden away. It was fated that Yamburg compete with Urengoy, its distinguished brother, and provide the country with what will essentially constitute its entire increase in natural gas recovery during the 12th Five-Year Plan period. From this alone, it is sufficient to comprehend the importance of developing this Arctic supergiant quickly and efficiently. But in fact, Yamburg is also the jumping-off ground for heading up into the higher latitudes.

Yamburg's future begins in Tyumen, on the bank of the Tura River, where Sibkomplektmontazh [Siberian Association for the Installation of Equipment in Complete Sets] specialists are building complex interlocking pontoon assemblies, each weighing several hundred tons. In Yamburg, the assemblers will put together powerful compressor stations, boiler houses and gas preparation installation shops from these assemblies, all of which will have a high degree of plant readiness. The complete unit of field facility construction has shown itself to be the sole method by which new field facilities can be built, both quickly and without additional expenses. The interlocking pontoons, which have made more than a thousand-km path, will be emplaced during the current navigation season.

Speaking of the situation in this arctic jumping-off place, we have intentionally emphasized certain questions of social welfare as well, since all the economic indices of this gas supergiant, which has been slated to begin operation for a year now, depend quite directly on the method by which these problems are presently being resolved.

The first party of several dozen persons came to Yamburg from Nadym during the extremely cold winter of 1982. It was a time of heroic efforts and high hopes. The gas producers, having determined who should be first to go this remote area, i.e. the road-builders and the power engineers, the assemblers and construction workers, counting on them to be an example which would hasten the more sluggish departments.

And so habitable railroad cars appeared on the shore of the Ob inlet. The little power plant motor began to knock. The white silence aroused the roar of the machinery and tractors. Specialists of varying skills continued to arrive along the field's winter roads.

Unfortunately, things went far from smoothly, and many obstacles, malfunctions and disruptions occurred as a result of the noncoordinated acts of the departments and the irresponsibility of certain of the supervisors, although of course we must not fail to take the extraordinarily severe natural conditions into consideration.

A lot has changed in the last year. One can even notice this from this helicopter as the machine circles over the place where the Nyudyamongotoyepoka (which means "a small river with many whirlpools" in the Nenets language) falls into the Ob inlet. The berthing wall, made of metallic sheet piling, is distinctly visible. Alongside the pioneer settlement, an entire operators' town has arisen. They have built the first two-story buildings. A hard-paved road has been laid into the tundra, and stretches out to the fields which are now being drilled, as well as to future fields. There is immeasurably more equipment here now. The numerous reservoirs and LEP [power transmission line] supports have given this place, which was completely unpopulated not so long ago, a fully industrial appearance.

Vigorous subdivisions, recently organized by Mingazprom [Ministry of the Gas Industry] and Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises] have shown up in the settlement: Yamburggazdobycha

[Yamburg Gas Recovery] Association and Glavyamburgneftegazstroy [Main Yamburg Oil and Gas Construction Administration]. Two major collectives--the purchaser and the contractor have been called upon to carry out the rapid and systematic construction of the field facilities, and to prepare for the time when the arctic gas flows into the main gas pipeline system. The Yamburg-Yelets large-diameter pipeline is being constructed at full speed, and the railroad workers are laying a rail line to here from Novyy Urengoy.

And more news: the Yamburg Council of People's Deputies has been formed. We met with A. Larichev, the ispolkom chairman.

"There are 25 deputies on the council," he said. "And there's plenty of work for everyone. At present we are drawing up a social and economic city document for Yamburg in order for us to have an accurate representation for the production base as well as the cultural and domestic facilities available for each subdivision. In spite of the severe natural conditions and the site's remoteness--we are actually 200 km north of the Arctic Circle--the population is growing rapidly. At present there are about 1,500 people in Yamburg, including 32 children. The ispolkom has just registered the arrival of two more new families, and more arrivals are awaiting their turn. Soon we will need nurseries, and by autumn we will need a school."

It was interesting to find out that the northerners have given their deputies, whom they elected to Yamburg's first Council, some orders. As it turned out, the people asked the Council for an uninterrupted supply of drinking water. And perhaps this is where the charm of the greater and lesser novelties ends, and where the fairly long list of problems begins.

A year and a half ago, when there was neither a main administration, an association of gas producers or any management for the construction of the field facilities, there were questions on the agenda of this collective of trail-blazers with regard to searching for drinking and service water, the preparing of a berth by the time of the navigation season, the constructing of a domestic gas pipeline, pouring of roads to the wells, constructing housing.... Seemingly mere details, but to a great extent, a great deal depends on details such as these.

The city gate to Yamburg are made up of a harbor, and berths. You won't get far on the winter roads, and helicopters are usable only a half-day per year here, thanks to the usual non-flying weather). There is still no railroad. That is why all freight comes to the field by water. And if the total amount of freight for last year came to several thousand tons, this year will see the arrival of a million tons of sand and gravel alone. Expansion of the harbor's landing area is only part of the task. An additional six berths need to be prepared, and the crane facilities need to be put in order. In order to manage all this by the deadline, our efforts will have to be doubled, even tripled. This strict interrelation has already come about in Yamburg: you will have no easy time delivering freight in the summer--winter will have passed, and there will be no available materials to build with, and you can't build berths in the summer, since the tundra can't be traversed when the snows are thawing.



Nothing is possible here without roads. The line out to the gas field, which we noticed from the helicopter, didn't go very far at all from the settlement. But this is precisely the route by which heavy assemblies will have to be delivered from the inlet shore. There is still a great deal of soil which will have to be poured onto the road bed. At the Yamburggazdobysha Association, they told us, "The fill will be completed by midsummer." This was difficult to believe. They explained: "There was a highly-placed representative from Mintransstroy [Ministry of Transport Construction]. He made a rough calculation with his colleagues, that if we poured 5,000 cubic meters per day starting today, and 10,000 cubic meters per day after a month, we can make the deadline..."

On paper it was easy. But in reality, during just the time we spent in the North, the quantity of soil which was not hauled out to the road came to tens of thousands of cubic meters.

By the way, concerning the soils. The local soils are little suited to construction use. The ice content comes to 40-70 percent, and during the thaw, the fill dries and shrinks by half. Several dozen km from Yamburg, on the Kruglyy Mys, geologists discovered a deposit of inert materials. This is common knowledge in the settlement, but the information is extremely contradictory. They say that there is enough sand and gravel for many years; others say that reserves are small, and a third group says that it's just as well not to remove the material, since a road needs to be laid there anyway.

But someone made a comparison of which was cheaper--this road, or hauling a sand-gravel mixture over via transshipments from Pechora, from the environs of Salekhard and from Sverdlovsk Oblast?

So today in Yamburg they are working on solutions to the same problems they had a year, and two years ago. Some with more success, some with less. Somehow or other the field facilities are being erected, the settlement boundaries are expanding and its population is growing. The people understand that they have been charged with accomplishing a task of major importance to the state here.

This is inspiring. But many people are unable to imagine their own personal future with sufficient clarity. Why is this? No matter whom we spoke with--in Yamburg, Nadym or Tyumen--about the prospects for constructing the field facilities for this unique gas condensate field, we heard one and the same thing.... However, we are going to give the floor to, even if only a few, of those with whom we talked.

B. ARNO, deputy general director for capital construction for the Yamburggazdobysha Association:

"This seems unlikely, but up to this point, no one can give a firm answer to the question of what Yamburg is going to have, a city or a shift settlement? I started working from the first day, both in Nadym and in Novyy Urengoy. Of course we made mistakes, miscalculations and missed the mark. But each of us knew that in a year or two we'd be building a school, a kindergarten and a

cultural center, and that he could count on an apartment after a certain time. Everything is unsettled here. We gas recovery workers are convinced that we should do the capital field facility construction in Yamburg, as well as live here, with all the necessary conditions for work and leisure.

A. Rogachev, chairman of the ispolkom of the Nadym Municipal Council of People's Deputies:

"There is a general plan for Yamburg which calls for 25,000 inhabitants. We came back to it more than once to refine it, and as a result designers from LenNIIPgradostroitel'stvo [Leningrad Scientific and Research and Design Institute for City Designing and Building] prepared a satisfactory alternative. But here is the trouble: after two years of using this plan, not a single structure has been built. There's no definiteness: who's going to do the building, what is going to be built and when will it be built? Meanwhile, time is flying. And I still believe this: there are already 70,000 people here in Novyy Urengoy, and it's still growing and growing. The Yamburg Field is a match for the Urengoy. How are we going to change it from a village of 25,000? No-o-o, we need a city. The positions of the party gorkom and the gorispolkom (to which the Yamburg Council is subordinate) are identical: let's build a major population center with large comfortable homes and a full selection of social and cultural facilities. And the sooner the better."

Both G. Alpatov, the chief of an oil and gas industry planning subsection of the Interdepartmental Territorial Commission on Questions Concerning the Development of the Western Siberian Complex, which is attached to USSR Gosplan, and G. Shirenko, head of Nadymgazpromstroy [Nadym Gas Industry Construction Trust] and others, said approximately the same thing.

Thus the buyer (the gas producers), the contractor (the builders), the party and Soviet agencies, and USSR Gosplan representatives in Siberia are all of one accord concerning the fact that the situation has become abnormal. The practice of developing the northern fields has already taught a number of object lessons. So in due course, parents tried to build the shift settlement of Pangody where, at one time, and with a persistence worthy of the highest application, literally sought out and returned their children, which they had brought out with them, and in spite of the interdiction, back to Nadym. We all know how it turned out. There are now 15,000 people living in Pangody, many gas producers who work in the Medvezhye Field, and who have been firmly settled in there for a long time. That is why it is so convenient: the family is here, and the fields are nearby.

Right now, we are writing these lines, but before our eyes are the pictures which have remained in our memories for such a long time. The temporary road out to the wells, which was damaged by a recent snowstorm, and along which the heavily laden trucks crawl, engines howling with the strain. The almost perpendicular sides of the ravine where metallic piles as thick as full-grown trees have to be screwed into their shafts in the permafrost. The shapeless hummocks of dirty-blue ice, and the Ob Inlet, pacified for the time being, which is capable of tossing any vessel onto the shore during a storm.

And the faces. The faces. The open, tired, beautiful faces of the the people, who are solving a problem of particular import in Yamburg. Lately more attention is being paid to the job they are doing. The complexities of development--unavoidable in such a major undertaking--are being surmounted through the collaborative efforts of party and soviet agencies, and various ministries and departments.

Last spring in Tyumen there was an out-of-town session of the USSR Gosplan board of directors. A wide circle of the problems encountered in developing the Western Siberian complex were studied locally by a group of the most prominent specialists, headed by N. K. Baybakov, deputy chairman of the USSR Council of Ministers, and USSR Gosplan chairman. The case in point at the meeting was Yamburg, as well as other gas fields whose turn had not yet come. It was a bold and confident look into the future. And were one to give a brief formulation of the results of this major discussion, it would sound approximately like this: Western Siberia will remain the country's most important fuel-energy base for the distant future as well, since this is precisely the place from which the major portion of our oil and gas will be obtained.

There are no doubts about this. There is concern about something else: how to retrieve this wealth competently, thriftily and with the least possible expenditures.

To make little comparison of courage and selflessness with the North. Radically new and highly-productive equipment is needed, as are timely and specific scientific recommendations. Yamburg obviously suffers from a scarcity of both of these. However, is this the case only here? And what about the oil workers? And around the region as a whole? We decided to find the answer to these questions, and that's why we were sent to all these new addresses....

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## NUCLEAR POWER

### IZHORA, LENINGRAD FACTORIES WORK TO IMPROVE AES COMPONENTS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 30 Apr 85 p 2

[Article by N. Markov, general director of the Central Scientific-Research and Planning-Design Boiler-Turbine Institute imeni I. I. Polzunov Scientific Production Association: "Our Efforts Have Been United"]

[Text] The well-known "Contract of the 28", agreed to ten years ago, was the first attempt at uniting the efforts of the Leningrad collectives which are involved in power production. Those who participated in the contract came up with an initiative which permitted the first units of the Sayan-Shushenskaya GES [Hydroelectric Power Station] to be put into operation two years ahead of the scheduled deadlines. But a great many of the most diverse tasks have already been encompassed by the comprehensive program entitled "Improving the Efficiency of the Country's Fuel and Power Complex".

As an example of this program, the success of the interaction on the regional level is graphically obvious. Members of the party obkom set themselves the task of providing complete shipments of equipment for million-kilowatt nuclear power blocks, and thereby reducing their installation time. In order to carry this off, it was necessary to start up production of the so-called "integrated capacities": a reactor, turbine and generator of equal power. Moreover, so as to improve the power blocks' efficiency, and to reduce outlays for metal and manufacturing labor-intensiveness, it became necessary to "break the sound barrier" with these units, i.e., to increase the turbine and generator rotational speed 2-fold, increasing them to 3000 rpm.

Perhaps the most difficult part of this task fell to the LMZ--the Leningrad Metallic Plant. Over 25 enterprises and scientific-research organizations helped the turbine builders develop the new machine and initiate its production, thus confirming the advantages of collective efforts: the first high-speed million-kw turbine, along with a reactor and generator have already been installed in the Rovenskaya AES.

By that time, the agreements on creative collaboration had become the basis of interaction, which agreements were concluded every year between collectives of Minenergomash [Ministry of Power Machine Building], Minelektroekhprom [Ministry of the Electrical Equipment Industry], Minkhimmash [Ministry of Chemical and Petroleum Machine Building] and the construction ministries.



And the intersectorial socialist competition among the partners assists in activating the work's progress in each of its directions. At present, this experiment is being developed to the utmost within the framework of the "Intensification-90" program.

Take, for example, the Izhorskiy Plant Association. Plant metallurgists are casting huge blanks for the million-kw power blocks' rotors, which will then be sent to Elektrosila and the LMZ. As a function of improving their production process, the workers from Izhora have learned to produce a 360-ton ingot. The solid-forged rotors made from these ingots are not only more reliable than the welded version, but are less labor intensive to manufacture as well. However, they consider this success to be a test of their powers. In the very near future, the unit capacities for nuclear power blocks are to increase a minimum of 1.5-fold. That is why the association workers are already thinking of how to learn to cast billets for 450-ton and even 500-ton rotors.

Working for power engineering's future, which is almost tantamount to tomorrow, has also become normal for a collective of the Elektrosila Association, where they are presently at work on a radically new machine: a cryogenic turbogenerator.

Quite recently, a prototype of this machine, which was developed by scientists of VNIIElektromashinostroyeniye [All-Union Scientific-Research Institute of Electric Machine Building], produced current for the first time. And an industrial 300,000-kw turbogenerator is already being built. Its windings are to operate at temperatures approaching  $-269^{\circ}$ , making its metals superconductors. Accordingly, electrical losses in the windings will also be reduced. As a result, the unit will be one third smaller and lighter than regular machines.

In the course of bringing this concept to fruition, there arose quite a few extremely complex problems. But they were solved as the first order of business with the support of such enterprises as the Izhorskiy Plant, "Bolshevik" and the Proletarskiy Plant. For the first time, the generator rotor will not be a cast or forged shaft, but an original type of thermos made up of several cylinders filled with liquified gas. In addition, new titanium alloys and special solders capable of enduring the deep cold and superhigh rotational speed will be used for the first time. The cryogenic turbogenerator is being developed according to a precise timetable: the Elektrosila collective intends to complete this assignment ahead of schedule, by the 27th Party Congress.

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## NUCLEAR POWER

### LACK OF DESIGN DOCUMENTATION DELAYS SMOLENSKAYA AEA

Moscow TRUD in Russian 15 Mar 85 p 2

[Article by V. Alimpiyev, brigade-leader of installers of the Smolensk administration of the Tsentroenergomontazh Trust and Hero of Socialist Labor; G. Abraamyan, brigade-leader of carpenters and concrete workers of the Apparatsroy administration; M. Bogutenok, brigade-leader of installers of the Mosspetsatomenergomontazh Trust; V. Starinskiy, brigade-leader of electricians of the Elektrotsentromontazh Trust; and A. Khachiyan, brigade-leader of kisloutouporshchiki of the Soyuzenergozashchita Association: "Without Taking The Real Situation Into Account": "What A Plan Lacking Documentation And Equipment Leads To"]

[Text] Who among us has not experienced that splendid feeling which follows the completion of a major and important work, when you yourself know and see that you did it competently and well? These moments in the life of a working man are unique and unforgettable. But the main thing is to be ready again for new tasks. Difficulties and the road ahead don't frighten you. A great project, intelligently organized, gives birth to great strength. We have been convinced of this on many occasions.

It was with such a feeling and mood that we entered the new year of 1985. And it was not just us, the authors of these lines, but the whole great collective of builders of the Smolenskaya AES. In essence, the second million-kilowatt power unit is about ready. Its completion is a matter of a few months and work is proceeding in the start-up phase. A substantial start has been made on the second section of the power plant. Ahead of us is an unusual year; one saturated with important events and dates. Like the whole country, we are preparing to finish the five-year plan in a worthy manner and mark the 40th anniversary of the Great Victory and the forthcoming congress of the party with labor victories. Socialist obligations and counterplans have been worked out in the brigades, sections and administrations. You can feel the enthusiasm at the construction site.

The plan for the present year was known to us: 50 million rubles for industrial construction and 14 million for civil construction. We energetically tackled the fulfillment of this program. True, work has been complicated by the fact that the project does not have all the necessary blueprints and specifications (proyektnaya dokumentatsiya). This means that not

all subdivisions have something to work on. And we, the brigade-leaders, feel this quite distinctly. The article of A. Lyadnov, the project party committee secretary: "A Fruitless Dialogue" (TRUD 16 January of this year), was devoted to these problems. The question of blueprints and specifications was put sharply and to the point.

But time passes and the picture does not change. The builders began preparatory (Nulevoy tsikl) work on the engine room and the deaeration stack of the second section. We can and must begin the installation of utility water pipelines and special conduits, but this is not possible. The absence of blueprints and specifications did not allow the ordering of power units, equipment and pipe in a timely fashion from the supplier plants. There is nothing to install. Many brigades of the Smolensk administration of the Tsentroenergomontazh Trust have found themselves with nothing to do.

There is total uncertainty as well in other contract subdivisions, such as the brigades of Mosspetsatomenergomontazh, Soyuzenergozashchita and Energomontazhventilyatsiya. More than 3,000 persons, specialists utilized for the most critical stages of construction, do not have a full work load and a clear idea of what they are supposed to do. And what is more, the ordering period for equipment to be delivered in 1986 ends not later than April. This means that our plans for the coming year as well are under real threat, because to all appearances we will again be unable to order equipment in time.

A few days ago, we found out that in the middle of February the plan for the project had been increased another 10 million rubles.

There is no denying that this is a considerable addition. It is difficult for us to judge what the ruling considerations were in USSR Gosplan and the USSR Ministry of Power and Electrification when making this decision. But it is certainly clear that a supplemental plan of such scope can be realized only where there are plans and specifications (proyekt) and the corresponding equipment. At present we do not have all the necessary plans and specifications and equipment for even the most urgent work. How is it that those organs which are responsible for the planned management of the economy can act in such fashion?

The plan's lack of documentation and resources can lead to a situation where the collective will fall behind. All of our obligations, calculations and hopes for a successful conclusion to the year may go to pot. We are talking about a collective which numbers 12,000 people. How is it possible to make a decision without inquiring into the present difficulties and concerns of a collective--without taking into account the real situation? The collective of Smolensk power-industry builders awaits an answer to these questions from its ministry.

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NUCLEAR POWER

AES TURBINE DESIGNERS LOWER METAL CONTENT

Leningrad VECHERNIY LENINGRAD in Russian 5 Jan 85 p 2

[Article by A. Andreyev: "The 'Million-Kilowatt Unit' Becomes Lighter", under the rubric: "By Means of Accelerating Scientific-Technical Progress"]

[Text] When the manufacture of the first high-speed turbine with a capacity of one million kilowatts reached the finish line a year ago, it seemed that the designers would be able to catch their breath and that there would be no major tasks ahead with regard to the improvement of the units. The drawings had already come to life in metal.

"The 'million-kilowatter' for the Rovenskaya AES begins the series of high-power turbines which our association has switched over to producing," says Yu. S. Muravko, head of the department of steam turbines for nuclear power plants of the SKB[Special Design Bureau] of the Turbina Leningrad Metallurgical Plant PO[Production Association]. "But series production of machines does not at all signify the end of the design process. First and foremost, considering the enormous weight of the unit, we are striving to reduce its metal content."

We should explain for the benefit of non-specialists that the "million-kilowatter" has four low-pressure cylinders (TsND), the body of each of which weighs a little less than 300 tons. The designers managed to reduce the weight of one cylinder by 80 tons, which results in economizing 320 tons of metal for the machine as a whole!

Everything began with research in the steam-turbine laboratory. The task was simply formulated: to find the optimal shape for elements of the body of the TsND[low-pressure cylinder] and to reduce the thickness of the walls while preserving necessary strength and rigidity. At the same time, researchers were looking for an alternate cylinder body for turbines intended for work, as scientists say, with raised backpressure. This is conditioned by the comparatively high temperature of the unit's cooling water. In such machines it is more profitable to use cheaper and shorter steel blades in place of the titanium blades presently used in "million-kilowatters". The association must deliver similar turbines to the Crimea AES and the GDR.



The researchers handed their studies over to the department's designers. The experienced specialist Yu. N. Yur'yev headed the work. The designers confirmed that it was possible to reduce the dimensions of the body of low-pressure cylinders for both steel and titanium blades. In the final analysis, they managed to narrow the exhaust section of the low-pressure cylinder by 1200 mm while preserving the cylinder's high aerodynamic qualities and rigidity. This reduction of a little over a meter resulted in economizing 80 tons of metal!

"Our association will begin to produce 'million-kilowatt' turbines based on the new blueprints in 1986," explains Yu. S. Muravko. "The first lightened machine will be sent to the Yuzhno-Ukrainskaya AES. Incidentally, the housing will also be manufactured in accordance with new blueprints. The housing has been given a noise-suppression function which will improve working conditions at the power plants."

The question of additional measures to ensure the accelerated development of the nuclear power industry to 1990 was examined at a meeting of the Politburo of the CPSU Central Committee in September of last year. As regards the designers of the "million-kilowatt" turbines, they have assigned themselves new tasks in connection with this. Now they want to reduce the metal content of yet another unit--the high-pressure cylinder.

A stamped-welded design for a vane to be used in low-pressure cylinders, is under development. These vanes will replace those which are being made at present from one-piece die forgings and whose manufacture is complicated and labor-intensive. During mechanical working alone, the labor required will be reduced to a quarter of its present level and the new vane will weigh only half as much. Chief of sector B. F. Soldatov and design engineer B. Yu. Mosenzhik are engaged in this work.

At present, the machining of metal structures and the blade system and rotors of the second turbine of the series is in full swing in the shops of the association. The second turbine is destined for the Khmel'nitskaya AES. The date of its birth will be 1985. Mastering of serial production of high-power, high-speed units continues. Much of the credit for this is due the collective of the department of steam turbines for nuclear power plants.

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## NUCLEAR POWER

### BRIEFS

**NEW AES TURBINES**--An official of the Leningrad Metallicheskiy Zavod Association speaks of plans to create a new generation of 1 million kW turbines for AES. They will also produce the same amount, or more, heat for communal heating. The first is to be installed at Minsk ATET's; in the future such turbines may be installed in Leningrad and in the Moscow area. Special atomic turbines for communal heating are also being designed in the turbo-motor works. The Polzunov Boiler Turbine Institute is directly involved in this research. At present, it has completed design of a 1.6 million kW block for the Kansk-Achinsk basin; there were great difficulties in designing the boiler unit. In the light of the recent Politburo discussion of thermal power stations the Institute analysed the state of equipment at all power stations and in a number of cases shortcomings were found. Equipment is being dispatched to reconstruct turbines. At the same time new units are being designed to simply replace the old ones; these are steam-gas installations which would produce savings of 10-15 percent. [Text] [Moscow Domestic Service in Russian 1430 GMT 12 Jun 85 LD]

**SMOLENSKAYA AES CONSTRUCTION UPDATE**--This is a busy time at the Smolenskaya AES. The second power-generating unit of the first section of the plant is being readied for start-up. Tests of turbine generators with a total power of one million kilowatts have begun. They are completing work on the reactor's central control room. The instrumentation is being adjusted and turned over to the operating staff. With the entry into service of the second power-generating unit, the power of the plant will double. The builders have already begun the construction of the building for the second section. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA 17 Mar 85 p 1] 12784

**IGNALINSKAYA AES INCREASING CAPACITY**--The Ignalinskaya AES, located in the Lithuanian SSR, has reached a capacity of 1,400 MW. The station's first power block should reach its projected capacity of 1,500 MW prior to the end of this year. An unloading-loading machine, which will permit an operating reactor to be recharged with fuel will be put into operation on the first power block by year's end. In addition, a central heating installation, which supplies the AES's industrial area with heat, is operating successfully. This has permitted a considerable economy to be effected. [Excerpt] [Moscow PRAVDA in Russian 12 May 85 p 1] 12659

## NON-NUCLEAR POWER

### UZBEK MINISTER CITES ACCIDENT AT SYRDAR'YA GRES

Tashkent PARTINAYA ZHIZN' in Russian No 3, Mar 85 pp 71-75

[Article by A. Khamidov, UzSSR minister of power and electrification: "Skillfully Combining Economic and Educational Efforts: Ideological, and Political-Educative Work"]

[Excerpt] One of Uzbekistan's electric power stations is the Syrdarinskaya GRES [State Regional Electric Power Station] imeni 50-letiya UzSSR, which is the largest in Central Asia. For a long time, the station failed to fulfill the technical and economic indicators or its obligations regarding reliability and efficiency in the operation of its equipment. There were objective causes for this: omissions in the plan, unfinished construction work and a major accident on block No 4, a great deal of assistance in the elimination of which was rendered us by outstanding party and economic agencies. But there were also subjective causes: a high work-force turnover, not only in the populous trades, but also of managerial workers, poor labor and production discipline, and a lack of concern regarding the power workers' living conditions. All these facts indicate that there was an almost total lack of educational work in the activity of the supervisors, nor was there any party organization.

Flaws in the style and operating methods of the former director and chief engineer and the cessation of economic practice from solving educational problems could not have failed to arouse concern, and on more than one occasion we made urgent recommendations to intensify educational efforts, and we pointed to the miscalculations in those efforts which had been detected, and which were occurring locally. The GRES management failed to draw the proper conclusions. The director and chief engineer had to be dismissed. This problem was taken up at a meeting of the board of directors and at a party meeting of the ministry, where a fundamental evaluation of the communist supervisors was made as well. The ministry workers drew the proper conclusions for themselves.

Since the appointment of a new director and chief engineer at the GRES, they have begun to place more emphasis not only on problems of production, but on the intensification of educational efforts and selection of the work force and their disposition. Primarily, this has applied to chiefs of shops and departments and their representatives. At the present time this means, in the majority, highly-skilled specialists and people in whom are combined the

functions of economic supervisor and the educator of people. The party stratum has been notably strengthened in the primary shops and in the repair brigades. The GRES party committee and the shop party organizations are profoundly and consistently occupied with the problems of strengthening labor and production discipline.

Affairs are improving at the Syrdarinskaya GRES, though not as rapidly as is needed. There is still a lot of work for us to do here. But I would like to see more emphasis placed on the affairs and needs of the power production workers and the Khavastskiy Rayon party committee, which has not always, and has inadequately looked into the activity of the GRES's party organization. This is a convincing indication of the fact that the difference between word and deed, and formalism in the work of education always lead to deplorable results.

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TES MODERNIZATION PROGRAM, PROJECTS REVIEWED

Moscow *EKONOMICHESKAYA GAZETA* in Russian No 21, May 85, p 2

[Article: "Renewal of Heat Power Plants" under the rubric "Technical - Economic Review"]

[Text] Recently the Politburo of the CPSU Central Committee reviewed the program for technical reequipment and reconstruction of heat power plants of Minenergo [Ministry of Power and Electrification], USSR, for the 1986 - 1990 period. Its completion will allow an increase in the reliability of power supply to the economy, and to the populations of cities and workers' villages; a more economical use of fuel; and an improvement in the working and living conditions of power engineers.

Heat power plants (TES) account for about 70 percent of power production. Along with this, most of the equipment installed at them is in need of radical update. Their effective fuel consumption is double and their specific cost of repair and personnel is five to ten times that of plants with modern equipment.

Realizing this has been envisaged during the first stage of the nation's Energy Program during the 80's by dismantling and modernizing aging and ineffective equipment at the power plants. This is an overall capacity of 55-60 million kilowatts.

Since the beginning of the 11th 5-Year Plan the USSR Minenergo system has removed worn out equipment for 2,500,000 kilowatts and modernized equipment with overall capacity of 20,000,000 kilowatts. It bears mention that a shortage of spare parts, and of replacement assemblies and parts has significantly hindered work on turbine and boiler units and replacement of turbines and steam pipes. The delays during the past four years in dismantling and modernizing power equipment has impeded in a number of places the quantity of power and heat supplied during this last, severe winter.

In the program for technical reequipment and reconstruction of TES there are expressed concrete steps for exchanging obsolete power units, modernizing pieces of power equipment, and reworking some power plants into heat or steam plants.

There are ten all-union machine buildings participating in the completion of this program. The bulk of this work falls on Minenergomash [Ministry of Power Machine Building].

In recent years power engineers working with machine builders have perfected a number of innovations which without decreasing technical and economic characteristics can prolong the life cycle of TES equipment from 1.7 to 2.5 times its resource limit, that is to the very limit of the period after which it would have to be taken out of service. This is caused by the fact that during the design life of a turbine, for example, its economy decreases by one to one and one-half percent, and specific fuel consumption increases due to the increase in the number of unscheduled outages to more than ten grams per kilowatt hour.

Exchanging units and parts which are beyond their design life with new and more modern ones with the intent of prolonging the equipments' service life by 10 - 15 years while simultaneously increasing their reliability and economy is the most important task of technical reequipping thermal power plants of USSR Minenergo. Completing the amount of work on turbine equipment which is called for in the five-year plan will lead to saving 370,000 tons of conventional fuel per year.

Turbine makers of Minenergomash's plants working with specialists of the USSR Minenergo have completed projects for highly effective modernized cylinders for K-160-130 and PT-60-130 turbines, which will be installed in exchange for equipment which has outlived its design life.

As a result of using new design solutions there is an increase in the reliability of these machines and the efficiency factor [KPD] of their moving parts by one to two percent, and for the PT-60-130 turbine, there is an increase in its capacity by 20,000 kilowatts. Changing units and parts on the PT-60-130 turbine will yield in the five-year plan an increase in their overall established capacity of more than 800,000 kilowatts.

In a number of boiler units as a result of modernization connected with new norms of accounting for durability there is the capability of increasing the steam parameters to rated capacity and increasing their reliability.

Through updating of auxiliary equipment the TES will use electric and turbine feed pumps with new modifications, and more reliable and economical circulating and condensing electric pumps. Obsolete turbine generators with individual capacity from 30,000 to 100,000 kilowatts are also yielding the way to new, more economical machinery.

Overall in the very near view there is a task to take out of service (through dismantling and conservation) power production equipment of the TES with overall capacity of 10,000,000 kilowatts, prolonging the service life of which is economically expedient. When this is done, forty-two power plants will be transformed into heating and steam boilers with no decrease in heat to customers. The loss of 1,300,000 kilowatts in power capacity will be compen-

sated for by the introduction of power equipment at new (expanded) power plants.

Modernization of operating TES equipment is one of the main thrusts in increasing the effectiveness of using fuel and energy resources in electric power.

We will modernize a number of turbines and boiler units at power plants. The effectiveness of this work on turbine equipment is expected to yield annual savings of 428,000 tons of standard fuel. Renovation at steam screen, steam regenerator, and tailing heating surfaces, of burner units, and of dust preparation will allow an increase in reliability and economy of their work, and provide savings of 697,000 tons of standard fuel per year.

There is also an intent to accomplish the modernization of control systems at 50 power units with a capacity of 300,000 kW each, which will allow broadening the frequency bands for current flow and active capacity of the power grid. At this time the start-up processes will be automated as will the fire extinguishing systems in the power units.

While creating the schemes for automatic regulation and discrete control there has been proposed the use of new solutions which allow maximum use of functional capabilities of the apparatus. Power units will be equipped with modern control and instrumentation complexes. Type IB-500 computers will be replaced with modern SM-50/60 and SM-2M computers, which are equipped with units to communicate with the installations and with means to present information.

Modernization of the control systems will take place at the Konakovskaya, Kostromskaya, Lukoml'skaya, Kirishskaya, Karmanovskaya, Irikil'skaya, Tripol'skaya, and Yermakovskaya GRES's. As a result here there is an increase in reliability of the work of equipment during its use in the regulated regime, and there is improvement in work conditions for service personnel.

As early as 1985 there are to be developed 30 technical and economic substantiations (TEO) and 70 projects for technical reequipment and reconstruction of TES's.

Preparation of the required documentation for conducting the work mentioned in the program is under way in the collectives of the branch planning institutes "Atomteploeletkroproyekt [Nuclear Thermal Power Planning]" and "VNIPInergoprom [All-Union Scientific Research and Planning Institute for the Power Industry]".

In the plan for technical reequipment and reconstruction of TES's there is a call for replacing the outgoing power capacity with basically new highly economical maneuverable condensation and heating equipment with turbines with capacity of 210,000 and 80,000 kilowatts. Distinguishing features on units presently produced for these purposes with small capacity boilers and vortex heating are operation on low quality types of fuel and the capability to be installed at existing TES sites.

Realization of measures for technical renewal of TES's demands from the work collectives of power engineers and machine builders a high degree of participation and a great deal of organization. Past experience attests to the special importance of exacting preparation during the beginning period of reconstruction and engineering ingenuity to be used in later organizational and technical decisions.

One good example of just such an approach is the organization of work at TETs Number 12, one of the oldest heat power plants of the Moscow Power Grid. Equipment reconstruction which started here in 1983 is being accomplished under conditions of active production without limiting the output to the users of electric power, steam, or hot water. Simultaneously there is work in progress on facilities for a smokestack, mazut storage, and other projects.

Conducting reconstruction was preceded by a great deal of preparatory work in developing technical documentation, issuing orders for preparation and delivery of equipment, training of construction personnel and installers in the special methods of work and safety rules while reconstruction was in progress in operating shops of a heat power plant. This was made easier because at TETs Number 12 during 1983 and 1984 each year they fulfilled the plans for capital expenditures and construction and installation work, and exchanged each year one turbine generator with 60,000 kilowatt capacity and rebuilt each year one boiler with 420 tons of steam capacity. The work was accomplished in the crowded periods of the summer repair campaign. The newly reintroduced power units participated in covering the winter peak load periods.

Reconstruction of TETs Number 12 allows us to improve the economic indicators of the living quarters of the central city and to substantially increase the reliability and economy of the equipment's work. According to calculations by specialists, as a result of the improvement in the technical and economic indicators by using this equipment there will be annual savings of no less than 5,000 tons of conventional fuel.

Quite responsible for the manufacture and delivery of parts and units of equipment for modernization and reconstruction of power plants is a collective of machine builders of the production association "Krasnyy Kotel'shchik" (Taganrog). All the orders from power engineers are being filled by them in the periods stipulated in the contracts and in accordance with specifications.

Along with this other enterprises of USSR Minenergo, Minenergomash, and several other ministries do not fully appreciate the social and economic importance of technical renewal of heat power plants. They are slow in starting this work in the Rostov and Chelyabinsk Power Grids, at the Novomoskovskaya GRES and at Khabarovskaya TETs-1. There are delays in reconstruction of the Pridneprovskaya GRES, where due to stoppages in construction of the heat piping there is under-utilization of the heating capacity of the reconstructed K-160 turbines, which causes an annual over-expenditure of 15,000 tons of conventional fuel.

There is less than complete fulfillment of the tasks of the program at the production association "Leningradskiy Metallicheskiy Zavod [Leningrad Metal



Plant]" and the "Turbomotor Plant" (Sverdlovsk). In debt to the power engineers are the Podol'sk Machine Building and the Syzran Turbine Plants of Minenergomash.

Presently there are envisaged special measures to help the collectives who are participating in accomplishing the tasks for technical reequipment and reconstruction of TES's. In particular, there is designated funding for capital expenditures to expand enterprises for power machine building, and directing to them in 1986 through 1988 a supplementary contingent of highly qualified workers for organization management, establishing reward bonuses for wholesale prices for manufactures for power plant units and equipment parts. Satisfaction has been taken by the scientists, designers, and planners with steps taken recently by the party and government for stimulating and increasing the prestige of labor for the creators of new technology.

This year and in the 12th Five-Year Plan the work collectives which participate in completing the program must significantly move ahead, insuring the fulfillment of all tasks and avoiding the delays allowed in the previous period.

9016

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## NON-NUCLEAR POWER

### KOLYMA GES RECEIVES TRANSFORMER VIA SEA OF OKHOTSK

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 23 May 85 p 1

[Article by S. Glukhov, SOTSIALISTICHESKAYA INDUSTRIYA correspondent: "The 'Sakhalin' Sets Its Course Northward: Reporting"]

[Excerpts] Vanino-Magadan--Sailors of the Far Eastern Fleet, have completed a complicated transport operation, having delivered--across two ice-covered seas--an essential load: a transformer, weighing many tons, for the Kolymskaya GES.

At first the supergiant transformer, which was manufactured in Zaporozhye, travelled across the entire country on a flatcar specially manufactured for the extremely long haul. In the port of Vanino, where the Baykal-Amur Mainline ends, the "Sakhalin-6", a diesel-electric powered ferry, awaited the flatcar. The minutes were counted as the heavy weight rolled along the rails to the ferry. However, the workers had been preparing for this loading operation for over two days: they reinforced the deck here and there, attached bitts and figured out and decided on a place for the railcar and the ship's ballast, so the vessel would maintain its stability during the switch.

As of the night of 7 May, the ferry had set its course northward. The extraordinary load was aboard and the road ahead was to be a difficult one: hundreds of briny miles of sea, through ice and the indefiniteness of the weather's caprices. The latest weather bulletin had said that several cyclones had just formed in the Sea of Japan and on the seaboard, and had changed to the identical course, straight north.

The by-pass route which was chosen turned out to be, as frequently happens in icy waters, the shortest, and exactly a week since embarking from Vanino, the diesel-electric ship tied up to Berth No 7 at the Magadan maritime trade port.

And here is where the first trouble awaited the sailors. It turned out that the Magadan workers were not ready to pick up the load, as they had not managed to lay a temporary rail line to the berth. Days later, the work was completed after a stint of rush work. There remained the wait for the night tide which, having raised the ferry a bit, would allow its deck to match the height of the rail embankment. But here, inclement weather interrupted the off-loading.

The five cyclones which had been travelling behind the "Sakhalin" had caught up with them again.

In addition, at the most inopportune moment, the sea began to swell, and the wind, rising with every passing hour, began to toss broken chunks of iceberg at the berth. The "Sakhalin" began to crowd up to a closely berthed ship with more and more force. The situation had become critical. At midnight they had to rouse the crews aboard the tugboats to push the hard-pressing ice floes away from the ferry's sides.

Now all the troubles have passed. The heavyweight load has been totally securely taken ashore and installed on a special platform. It now faces a 450-km drive on a multi-wheeled trailer along the famous Kolyma right-of-way to the Sinigorye settlement where the hydroelectric power station is located. There, the power engineers have begun to install the GES's next unit, for which the transformer delivered from Zaporozhye is also earmarked. The sea-going ferry, having taken leave of Magadan's Bay of Nagayevo, has set out for Kholmsk--its permanent port of registry.

12659

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## NON-NUCLEAR POWER

### LITHUANIAN DESIGNERS RAISE GAS BOILER EFFICIENCIES

Vilnius SOVETSKAYA LITVA in Russian 16 May 85 p 1

[Article by S. Krotkov, chief power engineer of the Lithuanian SSR's Ministry of Light Industry Puntukas Planning and Design Bureau, under the rubric "A Strict Accounting of Power Production Resources": "The Boiler House is Operating Efficiently."

[Text] It is well known that boiler plants use up a lot of power. Our republic is eliminating small-scale boilers and transferring their loads to the larger regional central heating plants which have high levels of automation and mechanization and low production costs for the thermal power which they produce. But small-scale boiler plants are still not rarities. Prudent gas consumption in these smaller plants is an important task.

As far back as several years ago, an operating gasified boilerhouse was considered to be a pain in the neck for the Puntukas PKB [Planning and Design Bureau]: the equipment frequently broke down, and as a result, we were barely able to stay within the limits of our fuel allocations, and there was no question of thinking about its efficiency. The power engineering service set itself the task of improving the operational efficiency and performance of our boilers.

They began by putting the fuel efficiency equipment and its individual elements (burners, shut-off equipment, gas lines) in proper working condition, and they also reorganized the operational department.

First of all they set up a brigade to maintain the equipment. Then they secured the primary and auxiliary boiler house assemblies: the boilers, gas lines, pumps etc. The collective was charged with looking after the technical condition of the equipment, with conducting preventive inspections, and, at the same time, with its repair. Here, the boiler operators' wages were derived through taking an account of the boilers' operating efficiency by shift.

The above-named organizational measures were reinforced by the engineering design and technical improvements. The obsolete boilers were replaced with more up-to-date, efficient units, thus effecting a fuel saving of up to 10



percent. On the recommendations of the Vilnius Gas Industry Operational Administration, specialists of the planning and design bureau were able to improve the technical condition and raise the maintenance level of the automatic safety equipment, and to regulate the boiler's primary heat engineering processes. The thermal modes for the boiler units were also adjusted, and the gas equipment was repaired and adjusted. The electrical circuits for the operating controls of the basic and auxiliary boiler equipment were modernized, and all boiler units were provided with performance charts so that combustion of the gas occurred with minimal losses.

An additional permanent unit--a specialist with excellent knowledge of gas-consuming equipment mechanisms and automatic boiler unit equipment--was provided to perform daily maintenance chores. They took this measure, it having been calculated that accurate monitoring of the combustion process in accordance with the performance charts, high-quality adjustments of the fuel efficiency equipment, and the provision of technically competent operation for the automatic safety and regulating equipment, in addition to improving the safety and operational reliability of the boiler units, effects a yearly fuel saving of 5-7 percent.

And so the total effect derived from the efforts undertaken by the Puntukas Planning and Design Bureau specialists comes to a 50,000 cubic meter, or 10 percent reduction in the volume of gas required by a boiler unit.

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NON-NUCLEAR POWER

BRIEFS

**BOILER SAFETY REGULATIONS PUBLISHED**--The "Regulations for Explosion Safety When Using Mazut and Natural Gas in PR 34-00-006-84 Boiler Units" were published in 1984 (by the All-Union Production Association for the Adjustment and Improvement of Production Processes and the Operation of USSR Minenergo Electric Power Stations and Networks, Moscow, 1984). The regulations, which are in accordance with USSR Gosstroy, USSR Minenergo, Minenergomash, and which have been approved by USSR Gosgortekhnadzor [possibly State Mining Technology Inspectorate], were developed based on the experience gained from designing, manufacturing and operating boiler units which operate on mazut or natural gas. The regulations set forth the basic organizational and technical requirements for the planning, installation, repair and operation of power-producing boiler installations, the meeting of which requirements provides explosion-free operation for these facilities while using natural gas and mazut. The regulations have been distributed to steam boiler installations with steam-generating capacities of 200 tons/hour and higher, with gauge pressures of 8 kilogram forces/cm<sup>2</sup> and higher, and to hot-water boiler installations having thermal outputs of 4 Hectocalories/hour and higher, and with the water being heated to 150° C. and higher. The regulations set the requirements for the planning and assembly of the boiler house building, the boiler installation heat supply equipment, and the boiler installation proper, and the requirements for process monitoring, safeguards and blocking. Outlined in the chapter "Boiler Installation Operation" are initial start-up sequence (after installation or a major overhaul), the start-up sequence of the boiler installation, and the order of its normal operation. Problems of an emergency condition, inspection and repair of the boiler installation have been considered, as well as general regulations for equipment maintenance. [Text] [Moscow ENERGETIK in Russian No 1, Jan 85 p 38] [COPYRIGHT: Energoatomizdat, "Energetik", 1985] 12659

**NOVOANGRENSKAYA GRES IN OPERATION**--(UzTAG)--The State Committee has accepted the first power block of the Novoangrenskaya GRES, which has a capacity of 300,000 kW, as ready for operation. The subdivisions of the Uzbekgidroenergostroy [Uzbek Hydroelectric Power Station Construction] Trust and the subcontracting organizations who did this job received an evaluation of "excellent" for their labor. The first switching on of the station's boiler unit, turbine and generator occurred a few weeks ago. At that time, mazut, a reserve fuel, was used in the furnace. However, at present all the GRES's coal supply systems--essentially, the entire mill which pulverizes the inexpensive coal mined from the adjacent Angren strip mine, has begun to operate. It is, in effect,

thanks to the efficient utilization of this raw material, in compliance with the decisions of the 26th CPSU Congress, that the power plant in the Angren River basin is also under construction. During the comprehensive coal-use tests, the block got almost all the way up to about 290,000 kW, about to its rated capacity. At present, in accordance with construction norms and regulations, it has been shut down for inspection, since that is the first time it has taken on so great a load. Following the inspection, which will be completed in a few days, the station's units will once again begin to operate, and a powerful stream of electricity will flow into the Central Asian United Power System. Meanwhile, the work being done on the second such block--another 300,000 kW unit--is being developed by collectives of Uzbekgidroenergostry. The project design calls for the Novoangrenskaya GRES to be equipped with eight power blocks, coming to a total station capacity of 2.4 million kW. [Text] [Tashkent PRAVDA VOSTOKA in Russian 9 Apr 85 p 1] 12659

POWER ACROSS AMU DARYA--Termez (UzTAG)--29 April. A powerful electrical current flowed across the Amu Darya into Afghanistan today from the Central Asian United Power System. The Amuzang-State Border-Afghan Shore 220,000-volt power line has been switched on. This 13-km-long power transmission line has its beginning at the Amuzang-2 Substation, which is the destination of the electrical flow from the Nurekskaya GES [Hydroelectric Power Station] in Tadzhikistan and the Navoiyskaya GRES [State Regional Electric Power Station] in Uzbekistan. From the substation, the line stretches to the Amu Darya, where a unique crossing has been erected. They set up 75-meter-high supports towers on both banks of the river, from which supports the 2.4-kilometer line is suspended over the water. [Excerpt] [Tashkent PRAVDA VOSTOKA in Russian 30 Apr 85 p 2] 12659

MUBAREKSKAYA TETS ON STREAM--The first power block of the Mubarekskaya TETs [Heat and Electric Power Station] (Kashka-Darya Oblast) has been put into operation. Its power will speed up the development of the Karshi Steppe, and the natural resource riches of Uzbekistan's southwestern area. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 16, Apr 85 p 2] 12659

MUBAREKSKAYA TETS INCREASES CAPACITIES--Karshi--The new TETs [Heat and Electric Power Station] here, the first phase of which has been put under industrial load, will provide the Mubarek Gas Treatment Plant with electric power and steam. The power from the central heating and power plant is used to purify gas of sulfur impurities, for the operation of pumping stations, and will come to the virgin lands farms of the Kashka-Darya Oblast. When the TETs's 2nd and 3rd phases are put on stream, its capacity will increase by over 2-fold. This will solve the problem of supplying power to Uzbekistan's largest gas treatment complex. [By R. Tell', SOTSIALISTICHESKAYA INDUSTRIYA correspondent] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 27 Apr 85 p 2] 12659

KARAGANDA-MANUFACTURED BOILER PRAISED--Karaganda--The Bratsk-1G water heating boiler, manufactured at the Karaganda Heating Equipment Plant, has been given the Quality Mark. This item is one of the collective's new products. The boiler has many virtues: it operates on inexpensive gas fuel, is equipped with an automated control system, and is highly efficient. The unit arrives at the construction site fully assembled, thus reducing its installation time considerably. [By B. Glotov, SOTSIALISTICHESKAYA INDUSTRIYA correspondent] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 4 May 85 p 2] 12659

**VOSTOCHNYY MINE STARTUP READY**--The Vostochnyy Open Pit Mine is now the main construction project in Ekibastuz. This year's plans include putting two phases into operation for the extraction of 15 million tons of coal. Work on the first phase is to be completed as early as June. The tone of this operation is being set by installers of the Ekibastuz Administration of the Kazpromtekhmontazh [possibly Kazakh Industrial Equipment Installation] Trust. They have already readied the first excavator, and are assembling the second one. A conveyer line, along which the coal is to be transported from the rotary excavators to the surface, has been laid out along the bottom of the trench. Installers of the Kazpromtekhmontazh and Kazelektromontazh [Kazakh Electric Wiring] trusts are able and desirous of improving their efforts. However, the general contractor--the Ekibastuzshakhtostroy [Ekibastuz Mine Construction] Combine has been late in making the work front available to them. The foundations for the ore blending and loading machine are still not ready. The electric equipment for the conveyer lines have not been delivered to the construction site on time. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 17, Apr 85 p 18] 12659

**EKIBASTUZSKAYA GRES-1 LABOR IMPROVES**--The Ekibastuzskaya GRES-1 collective has not managed to meet plan quotas for electric power production for a long time. The measures accepted by the city's party, soviet and industrial agencies for strengthening labor and production discipline here, and for increasing the liability of each worker, have produced positive results. The station has been working stably since February. Today, the power engineers have 2.5 million kW/hours of above-plan electric power to their account. The collective of the shift led by V. Selivanov is an example of high responsibility to their assigned business. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 17, Apr 85 p 18] 12659

**NUREK GES, OTHER PLANS**--Since the startup of the first unit, Nurek GES has generated about 80 billion kW/hrs of electricity' every year it provides about 2-3 billion cu/m of water for irrigation. It is calculated that all the GES' costs had been paid off by 1900. Technical re-equipment of the power units will be completed by the end of 1986 and the GES capacity will be increased by 10 percent to 3 million kW. The GES generates annually from 10 billion to 11.8 billion kW/hrs of electricity. The cost of electricity is insignificant: 10 kW/hrs of electricity costs less than 1 kopek. Designs have been drawn up for the seventh stage of the Vakhsh cascade, Sang-Tudinskaya GES which will have a capacity of almost 1 million kW. Construction is to begin in the 12th FYP. The possibility is being considered of completing exploitation of the Vakhsh by the year 2000 by constructing the final stage, Shurobskaya GES with a capacity of 800,000 kW. [Summary] [Moscow Domestic Service in Russian 1440 GMT 11 Jun 85]



**STAROBESHEVSKAYA GRES BLOCK REBUILT**--Following renovation, a 200,000 KW power block has been put into operation at the Starobeshevskaya GRES [State Regional Electric Power Station]. Now, instead of using high-grade coal in its furnaces, secondary raw material from concentrating mills and dust formed in the process of anthracite extraction are burned. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 21, May 85 p 3] 12659

**LIGNITE ASH BECOMES RESOURCE**--UzSSR--The first power block, recently put on stream at the Angrenskaya GRES-2 [State Regional Electric Power Station], is the main consumer of Angren's inexpensive lignite. The ash formed when the fuel is burned in the station's boilers comes to Angrenenergotsvetmet, where building blocks are manufactured from the slag. The ash-slag wastes which come from Angrenenergotsvetmet, in due course, are the basic raw material used by the Angren Ceramic Combine, which produces facing tiles, pipe and sanitary engineering equipment. This is how a complex for the waste-less utilization of lignite coal was set up. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 21, May 85 p 2] 12659

**MINSKAYA TETS-3 LAUDED**--The collective of the Minskaya TETS-3--the largest power-production enterprise in Minsk--is working successfully these days. According to the first quarter results, this collective has been awarded a prize-winning place for its high indicators in the sectorial competition. Since the beginning of the year, over a thousand tons of standard fuel have been saved, thus allowing one day--9 May--to be worked off on these resources. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 21, May 85 p 2] 12659

**IGNALINSKAYA AES REACHES CAPACITY**--The first power block of the Ignalinskaya Nuclear Power Station has reached its design output--1.5 million KW. World nuclear power production has never known reactors as powerful as this one. This high mark has served as a pole star for AES operators for almost a year and a half, i.e., since the first block was put into operation. Under the supervision of scientists and specialists of varying skills, they have been approaching this mark gradually, a stage at a time. Capacity was attained according to plan. The Ignalinskaya AES produced over 8 billion KW/hours of electric power during this time. This power has been channeled into the power courses of the country's Northwestern Unified Power System. Construction of the Ignalinskaya AES's second block is proceeding apace. Utilizing industrial labor methods and widespread implementation of the section contract, the builders have achieved considerable successes. Thus the best brigades are outdoing their shift assignments by 1.5-2-fold. Among the right-flank in the socialist competition to shorten the time for erecting the nuclear power station are the brigades led by A. Ponomarev, I. Aleynikov, B. Machyulaytis, A. Shirmer and others. [By Yu. Stroganov] [Text] [Vilnius SOVETSKAYA LITVA in Russian 25 May 85 p 1] 12659

KONAKOVSKAYA GRES REPAIRS--Konakova--(TASS)--A figure of 250 billion has appeared on the accounts of the Konakovskaya GRES. This many kiloWatt hours has been delivered by this power station to the economy in just over twenty years since the day it became operational. In recent years at the GRES there has not been a single accident attributable to service personnel. It has successfully passed the difficult test of last winter. The operators act in close cooperation with maintenance personnel, whose pay depends on the condition of the power units and their economy. The people at Konakova are constantly modernizing their equipment, being the first among power engineers to begin using the automated control system for production. The computer helps keep the equipment in the most economical regime. This year the station has already operated for one day on saved fuel, and has taken on the task to work yet another day on saved fuel before the end of the year. [Excerpts] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 26 May 85 p 1] 9016

VOLZHSKAYA GES REPAIRS--There soon will have been thirty years since the delivery of the first current from the Volzhskaya GES (Hydroelectric Plant) imeni V.I. Lenina. It has already by more than six times paid for the cost of its construction and start-up. Now here while the plant is operating there is in progress reconstruction of the hydraulic turbine and electrical equipment. Blades of ten of the twenty units have already been exchanged for ones made from new, more friction resistant materials. After the reconstruction is finished there will be an increase in the reliability and service life of the equipment, and the plant's capacity will be increased. [Text] [Moscow PRAVDA in Russian 19 May 85 p 1] 9016

CSO: 1822/239

## ENERGY CONSERVATION

### CONTROLS ON GASOLINE USE ADVOCATED

[Editorial Report] Moscow PRAVDA in Russian 27 June 1985 on page 3 carries two related articles under the rubric "The Resources Around Us" on the illegal diversion of fuel oil supplies into the private sector, which results in an annual loss to the national budget of "over R 2 billion." In Lithuania, the People's Control Committee has implicated employees of the oil-products supply enterprises and gasoline stations as "active participants" in this diversion of fuel. During inspections, according to the authors, registered fuel sales suddenly increase, especially at stations where sales are conducted in cash, and return to their previous, low level after the inspectors have left. To halt this flow of gasoline "to the left," or the private sector, the authors, a People's Control Committee supervisor and a PRAVDA correspondent, propose the sale of gasoline coupons to car owners "on credit - through state enterprises, kolkhozes, sovkhozes," to be subsequently deducted from salaries. Coupon booklets would be issued that "would suffice to operate a car for about a year." The owner would record mileage from the speedometer inside the booklet and "during annual inspections a complete examination of the speedometer, mileage and fuel consumption should be conducted." In the related article of the same issue of PRAVDA, the plight of private drivers in the Belorussian countryside is bemoaned. These drivers are "forced" to purchase diverted gasoline supplies due to the lack of gasoline stations in rural areas, the author claims. The Belorussian People's Control Committee, having determined that rural oil storage facility capacity is underutilized by more than one-half, proposed that gasoline be rationed out by kolkhoz and sovkhoz management at these facilities. Thus far, agreements have been concluded with 1,477 enterprises, or one-half the total number. The author claims that with universal implementation, "the need for constructing large numbers of gasoline stations will be avoided, millions of rubles will be saved and workers for new gasoline stations will not be needed."

CSO: 1822/284

GENERAL

POWER MINISTER REACTS TO GORBACHEV ON INDUSTRIAL POLLUTION

PM111514 Moscow IZVESTIYA in Russian 5 Jul 85 p 4

[Abbreviated version of speech by Deputy A. I. Mayorets (USSR Minister of Power and Electrification at the 2 July afternoon session of the USSR Supreme Soviet of Nationalities]

[Text] Esteemed Comrade Deputies! It was with a feeling of tremendous satisfaction that we heard the speech by Comrade M.S. Gorbachev, general secretary of the CPSU Central Committee, at today's USSR Supreme Soviet Presidium session, which stressed the need for Soviets' activity to be persistently improved, for each link of our society's political system to efficiently perform its functions, and for the party's leading role and its influence on all sectors of state, economic, social, and cultural building to be further enhanced.

The problems of environmental protection and rational utilization of natural resources have always been and are constantly in the purview of the CPSU Central Committee, the USSR Supreme Soviet Presidium, and the Soviet government.

The USSR Ministry of Power and Electrification pays attention to questions of nature conservation activity, since the process of energy production inevitably produces a large quantity of gaseous and solid waste.

Over the last few years the ministry has carried out a large volume of work to construct new nature conservation projects, reconstruct and modernize existing installations, and enhance the standard of operation of nature conservation and power industry equipment. New ash-trapping units for power blocks have been developed and commissioned, effective measures are being introduced to reduce the formation of nitrogen oxides, and plans for power stations producing no effluent are being implemented. As a result of the measures that have been taken, and despite the considerable growth in heat and electricity generation, the discharge of harmful substances into the atmosphere has been reduced, the extent to which harmful substances in exhaust gases are trapped has increased, the discharge of polluted effluent has been halved, and the consumption of fresh water has been reduced.

At the same time, there are omissions and shortcomings in the important work on protection of the environment. In 1984 the CPSU Central Committee and the USSR Council of Ministers criticized our ministry for inadequate nature con-



servation measures at enterprises in Kemerovo and other cities and for lagging in the commissioning of experimental industrial installations for the trapping installations so as to meet the deadlines set by the USSR Council of Ministers resolution.

During the 12th 5-year plan the ministry will be faced with serious scientific, technical, and practical tasks in the sphere of energy supply and protection of the environment stemming from the main directions of the sector's development in the light of the USSR energy program through the year 2000.

The solution of these questions, which are exceptionally important for the power industry, lies at the interface between applied and fundamental sciences and is intersectorial in nature. What is needed are joint efforts by scientific and design organizations and enterprises in the power industry, power and chemical machine building, coal extraction and petroleum refining industries, and construction materials industry. In our view, the USSR Gosplan, the State Committee for Science and Technology, and the USSR Academy of Sciences could head and coordinate these efforts within the framework of a unified program.

The USSR Ministry of Power and Electrification will take all necessary measures for the elaboration and implementation of such a program and will channel the efforts of the sector's scientific research and design institutes, organizations, and enterprises toward the solution of nature conservation problems in the light of the critical remarks made at the present session.

As well as by an increase in the responsibility of ministries, departments, organizations, and enterprises, the more efficient solution of the tasks of environmental protection and of the rational utilization of natural resources in our country will also be helped by:

--an improvement in the planning of nature conservation measures and the introduction of better methods for determining their economic effectiveness;

--the elaboration of a long-term state program for protection of the environment and rational utilization of the USSR's natural resources;

--the implementation of mandatory expert ecological appraisals of new machines, technologies, and materials and of plans for the construction, reconstruction, and retooling of enterprises, and also the toughening up of demands regarding nature conservation in the technological and design construction norms and regulations.

Allow me to assure you, comrade deputies, that Soviet power industry workers will do everything necessary to ensure that the reliable supply of the country with electricity and thermal energy is accompanied by effective measures for protection of the environment and the rational utilization of natural resources.

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GENERAL

NOVOSIBIRSK BOOK ON INTERBRANCH ENERGY SYSTEM MODEL REVIEWED

Moscow EKONOMIKA I MATEMATICHESKIYE METODY in Russian vol 21 No 2, Mar-Apr 85 pp 371-374

[Review by T. M. Polyanskaya of book "Modelirovaniye Dinamiki Mezhotraslevykh Svyazey Energetiki" ["A Model of the Dynamics of the Interbranch Connections of Power Engineering"] by M. A. Gershenzon, Novosibirsk: Nauka, Siberian Division, 1983, 237 pp]

[Excerpts] In his constructions of models of the interbranch balance, M. A. Gershenzon attempts first of all to avoid the artificial partitioning of the economy into blocks, which partitioning is usually carried out in order to adapt the interbranch connections to certain previously fixed schemes, or to a corresponding diagonal or block-diagonal matrix structure of extant flow-line production systems. He proposes a more general approach to the analysis of the interbranch connections, in which a priori suggestions as to their structure are not made. This approach, in our view, merits attention. The essence of his approach consists in using an evaluation of the significance of the flow-lines of a numerical interbranch model to separate the branch complexes of the economy by solving the problem of determining the economy's structure with the least possible number of groups, the percentage error of which does not exceed a certain allowable extent. The determination of this structure allows the complexes to be aggregated, which makes it possible to identify both the complexes themselves and their interconnections. It should be mentioned that when using this approach the results obtained from solving the set problem depend on correctness in the choice of a threshold value for the flow-lines and the allowable percentage error, and the final acceptance of the solution should be preceded by a non-formal content analysis of the connections which have been obtained. Unfortunately, the monograph does not examine the role of these factors, and the author does not indicate his attitude toward them. Neither does he discuss the doubt-evoking sectorial structure of certain experimental calculations from ten of the sectorial complexes, calculations which were discovered only by their formal attributes.

The book places a great deal of emphasis on the balance relationships of the interbranch models. In these relationships, as we all know, the balance designates the equation of the demand for resources to the planned volumes of their production, at a fixed level of effectiveness. The simplifications brought in during the construction of these models, which are connected with the fail-

ure to take into account the possible limitations on the growth rate of the branches, and with the tolerance of full utilization of resources, can distort the proportions of the economy's development to a considerable degree. In order to avoid this, the interbranch balance relationships which reflect the utilization of material and labor resources need to be considered, as do the peculiarities of the dynamics of individual branch systems. The specific nature of the branches is characterized by relatively sluggish growth, which is connected with real possibilities for upward and downward fluctuations in production which are caused by the limitations in natural resources, in attracting workers, in the growth of technical potential etc. To account for this, the author suggests that the balance proportions of the numerical models be supplemented by the limitations in the probable changes in the annual growth rate in the branches' output. Provision is also made for the possibility that the resources will not be completely utilized (during the yearly production cycle), which will eliminate weak spots in later times.

Three groups of branches are separated in the model: 1--those, the outputs of which are entered as part of the current production needs and part of the increase in circulating capital; 2--capital-creating branches; 3--branches which produce output not for production purposes. For the 1st and 2nd groups, the balance equations take into account the scarcity or surplus of their output and carry-over stocks, and the limits of the possible annual change in branch production of output is found for them with the aid of a certain coefficient which takes a previously-attained level of production into account. Allowable growth rate values for the branches in the third group are set by a suitable scale which describes a matrix, the number of lines of which equals the number of branches in the group and the number of columns of which equals the number of levels in the scale. The practical convenience of the latter lie in the fact that it gives us a simple and natural method for including indicators of change in the demand structure into the model, which indicators depend on its allowable level, as well as on production volumes.

The results of the calculations made by the author in his evaluation of the national economic consequences of the conversion during the preceding 20 year to more capital-intensive power engineering, are interesting. For the most part, he emphasizes the study of the factors which can determine the interrelation between power engineering and the economy. The obtained quantitative evaluations, in spite of their by and large conditional nature, are interesting primarily as indicators of the degree of influence these factors have on the growth of the economy. The primary conclusion comes from the fact that there are practicable methods for bringing about a substantial reduction in the negative effect of the accelerated growth of capital-intensive power engineering (the saving of capital in power engineering and energy saving in all sectors of the national economy; the development of reserves, a change in the volume and structure of fuel exports, etc.). As the author notes, their presence precludes our dramatizing the consequences of our new power-production situation. The task for the control figures for the adaptive model of the volume of PPT [production fuel demand], the extent of capital investments in the TEK [fuel-energy complex], and other indicators have made it possible for the author to "play out" various situations in supplying fuel, including that of evaluating the national economic results of a reduction in

the PPT growth rate, caused by an insufficient volume of investments in the TEK. It might be well to point out that for this reason, a fuel shortage can lead to extensive losses in national revenue volumes and in the consumption fund, and can lead as well to considerably limited growth in the source of capital investments: the branches of the investment complex. This conclusion is especially important in light of increased capital intensiveness in the fuel-energy complex; an increase or reduction in the capital investments put into the fuel-energy complex requires serious justifications on a national economic level.

The book's structure is less than felicitous. For example, an examination of a number of the concepts used when modelling interbranch connections (balance, indefiniteness, stability, adaptation), and of well-known numerical models, with a view to discovering ways by which they might be improved, should be included among the sections where its methods are described. The qualitative and quantitative conclusions arrived at concerning the results of experimental calculations would have been more thrust, had they been taken from the different chapters of the book and put together into one section, thus summing up his work.

In our view, the monograph would profit through wider elucidation of the quantitative results of the calculations made by the author. Even with their considerable conventionality, they are extremely interesting.

Despite the contestability of a number of positions, one can assert that the book is a step forward in the working out of methods for the mutually consistent forecasting of power engineering and the economy. Today, in power engineering's state of growth, the book's conclusions should be considered as extremely timely.

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GENERAL

#### UKRAINIAN OFFICIAL REVIEWS POWER PRODUCTION FIGURES

[Editorial Report] Kiev ENERGETIKA I ELEKTRIFIKATSIYA in Russian No 2, April-June, 1985 carries a 2300 word review on pages 2-5 of the Ukrainian energy situation under the rubric "The Final Year of the Five-Year Plan -- Shock Labor" by V.I. Masumov, Deputy Chief of the Economic Planning Administration of the Ukraine's Ministry of Power and Electrification. In reviewing first the accomplishments of 1984 for the USSR, the author states that "the installed capacity of all Soviet electric power stations passed the 300 million kilowatt mark, and electric energy production reached 1,493 billion kWh, for a growth of 43.7 percent over 1975." In the Ukraine, 7.5 million kilowatts of power was added during 1980-1984, bringing total installed capacity to 50.3 million kilowatts. Nine Ukrainian power stations have a capacity of over 2 million kilowatts, or a share of over 50 percent in the republic's total capacity. Further, "during the four previous years of the five-year plan, the effective consumption of fuel was lowered by 3 grams per kWh, resulting in a savings of 1.43 million tons of fuel compared to the 1980 level." The author also states that "the number of Type I accidents and failures, due to human error, was lowered during 1984." During 1985, "the Ukrainian Ministry of Power and Electrification must manage a level of capital spending surpassing 593 million rubles, 21 percent higher than the 1984 level. We must bring on-line 1.14 million kilowatts in new power, including the second unit of the Zaporozhskaya AES (1 million kw) and the second gas-turbine installation at the Simferopolskaya TETs (107,000 kw)." The construction of 22,900 kilometers of power lines is planned, which will primarily serve the rural sector, while "power production in the Ukraine should reach 269 billion kWh in 1985, an increase of 4.5 percent."

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